**MOTIVATION**

- Bacterial infections are the world's leading cause of premature deaths and the third in line after cancer and cardiovascular related mortalities.
- The absence of an early conclusive diagnostic proof, clinicians empirical antibiotic therapy and the excessive use of antibiotics results in risk of toxicity , super infections and selection of multiple drug resistant strains.
- Pathogen associated molecular patterns (PAMPs), such as lipoteichoic acid (LTA) can serve as early indicators of Gram-positive bacterial infection.
- We are developing strategies for efficient management of bloodstream Gram-positive bacterial infections. The objective are as follows:

  I. A point-of-care assay for early and rapid diagnosis of Gram-positive bacteremia
  II. Identify small molecule as a potential ligands for in vitro diagnosis

**Gram-positive contribute 60% of total bacterial infection cases**

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**I. Septiflo-P technology**

- Capturing Ligand
- Lipoteichoic acid (LTA)
- Anti LTA antibody
- Spot indicates Gram-positive infection

Similar system was developed for Gram-negative infection detection (Septiflo-N)

**Characterization of Gold (AuNP) Nanobioconjugates**

**UV-Vis spectroscopy**

- Peak shift in wavelength (λmax) suggests successful conjugation of ligand to the AuNP surface
- Barford assay showed Abs: AuNPs conjugation ratio ~ 6:1 (on average)

**Color gradient based on LTA concentrations**

**Peak broadening in LPS-alex mixture using 1H NMR**

**Proposed model of LPS-alex interaction**

- Single system
- Two system

**Kinetics of LPS-alex binding using surface plasmon resonance (SPR) spectroscopy**

**Industrial significance**

- High throughput, simple, handy and affordable stratification device which can be utilized at patients bedside
- Currently no bedside device clinically approved for stratification of Gram status in blood samples
- The technology can be translated to commercial scale as the components are simple and cost effective
- In future antibody ligands can be replaced with small molecules to reduce overall cost of the device: the work is underway
- Current status: clinical trials are running at Government Medical Hospitals, New Delhi

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